Flex-tine cultivator made from an old spike tooth harrow

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A flex-tine cultivator, also called spring-tine cultivator or light springtooth harrow is used for mechanical weed control. It scratches the soil surface uprooting weed seedlings at the white root stage, before they emerge. The effectiveness of the cultivator decreases after the weeds emerge or when their roots extend below the depth which the cultivator tines penetrate the soil. It is not effective in controlling perennial weeds or annual weeds with well-established roots

This describes how to make a 10-foot wide, 2 section flex-tine cultivator (Figure 1) from an old 8-foot wide 2 section spike-tooth harrow (Figure 2). The spikes on the harrow are replaced with spring harrow teeth. The width is increased from 8 to 10 feet. The converted flex-tine cultivator is fitted with a 3-point hitch frame on gauge wheels.

Figure 1. A 10 foot wide, 2-section flex-tine cultivator made from a spike-tooth harrow.

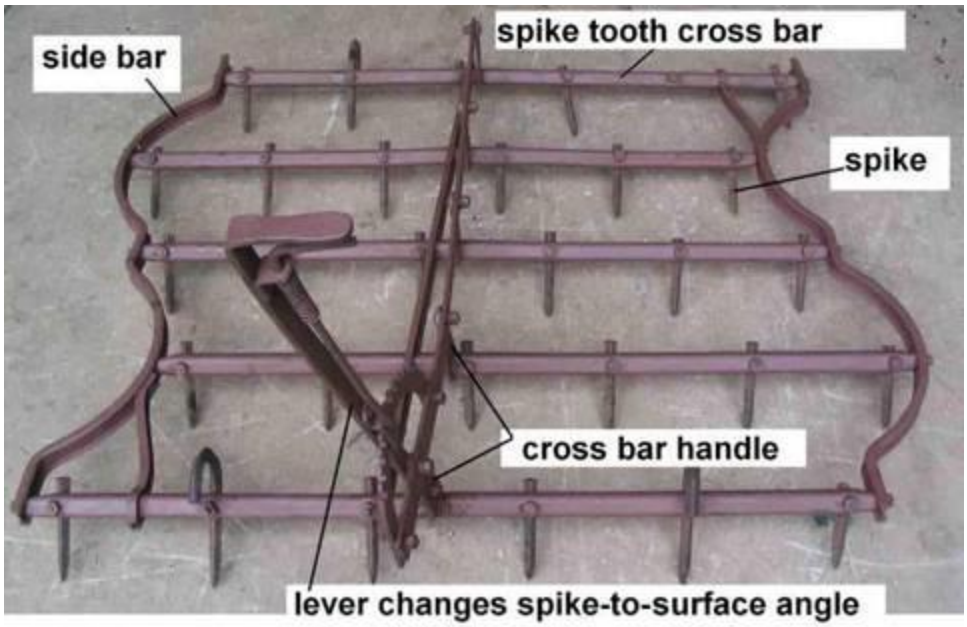

Figure 2. A 4-foot section of an 8-foot-wide spike-tooth harrow. In this conversion, only the lever mechanism and side bars were used; the spikes, spike-tooth cross bars and cross bar handles were discarded.

This conversion uses Shoup Parts SH814800 spring harrow teeth (www.shoupparts.com), equivalent to Case-IH 814800C1 spring harrow teeth (www.caseih.com/parts). They have conical coiled springs with gaps between the coiled wires. Unlike tightly coiled cylindrical designs, the conical design (see Figure 3) allows the tines to vibrate more freely on the soil surface to dislodge weeds. The 16-inch tine length provides surface leverage against the spring tension, and adequate field clearance when cultivating taller crops.

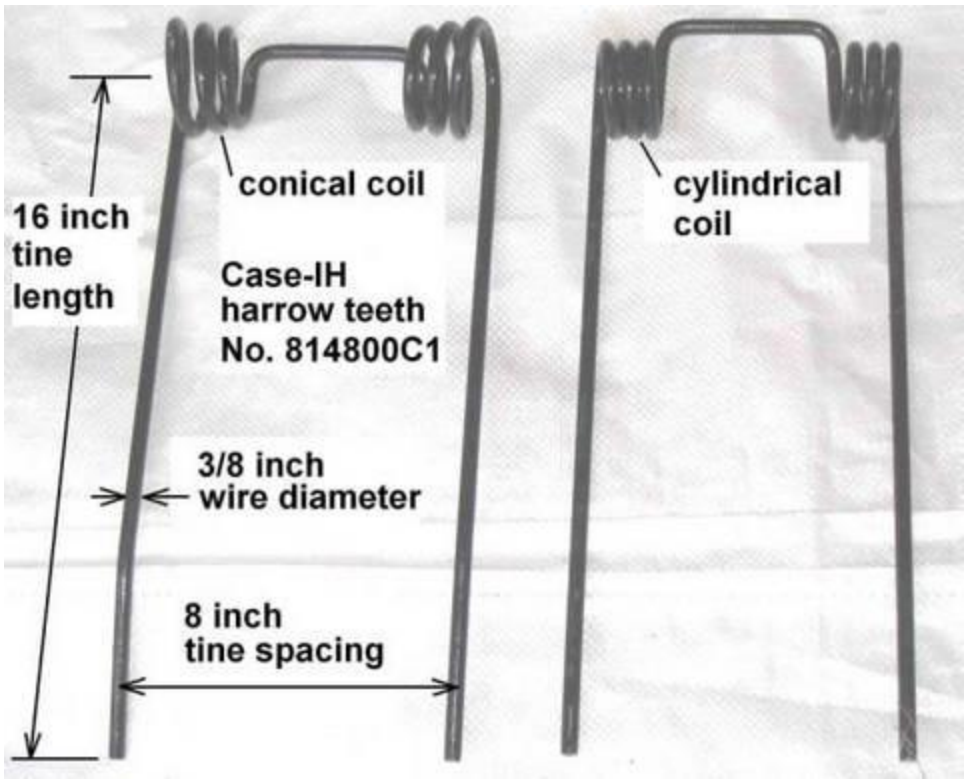

Figure 3. Spring harrow teeth with conical coiled springs and gaps between the coiled wire (left) and cylindrical coiled spring harrow teeth (right).

The field performance of this cultivator is between the 'Lely' flex-tine cultivator and a spike-tooth harrow. The cultivator's 3/8-inch (9.5 mm) diameter tines are less flexible than the 6 mm diameter tines of the Lely cultivator. This allows a deeper soil penetration but less lateral movement. Compared to the rigid mounted spikes of the spike-tooth harrow, the cultivator tines do not penetrate the soil as deeply. However, the cultivator's tines have better surface contact on uneven surfaces due to their spring tension. This cultivator creates 1-inch-tall hills and valleys on the soil surface. The tines scratch the surface, dislodge weed seedlings and create valleys. Hills are created where tines push soil aside burying short weed seedlings. Timing of cultivation is critical for successful weed control. When using the cultivator prior to crop emergence, the tine depth is set to cultivate above the crop seeds, typically 1/2 to 1 inch deep. After crop emergence, the tine depth is set according to the crop tolerance for cultivation. Cultivation will damage a portion of the crop. To compensate for this loss, increase the seeding rate at planting. The cultivator can be used to cultivate beans and garlic as well as break up large soil clods.

Construction: 1. Disassemble the spike-tooth harrow. If the cross bars are reused, remove the spikes from cross bars. If the cross bars are not reused, make new cross bars from 1 inch (or 11/4 inch) galvanized pipes. To make a 10-foot-wide cultivator, cut ten 56-inch-long pipes. Weld 5/8 x 1 1/2-inch bolts on the ends of the pipe for attaching the pipe to the harrow side bar (Figure 4).

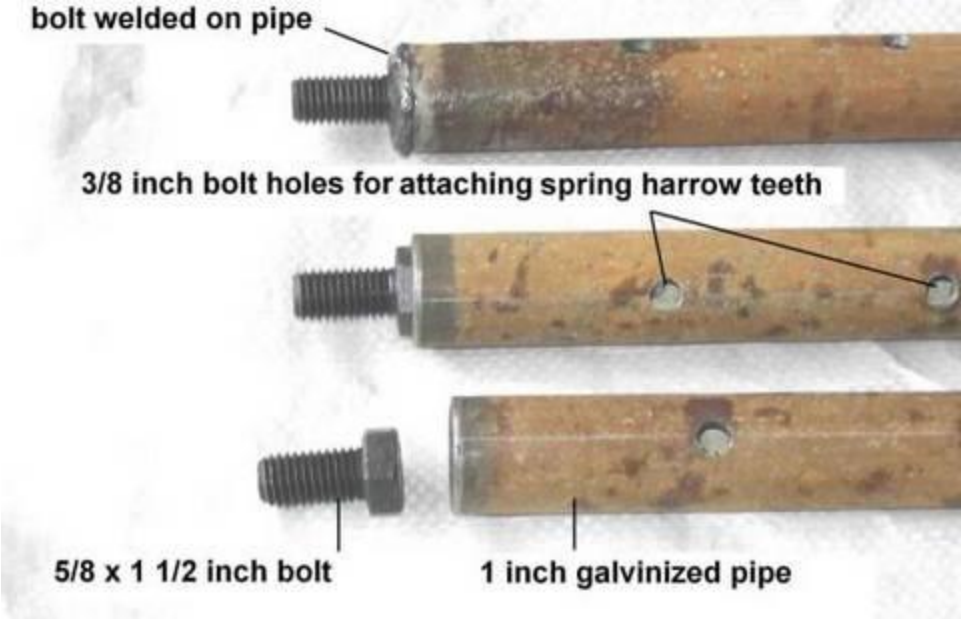

Figure 4. Cross bar with mounting bolt (5/8" x 1 1/2") welded on 1-inch galvanized pipe.

2. Drill 3/8-inch bolt holes in pairs, 3 1/4 inch apart, on the old spike cross bar or on the 1-inch galvanized pipe for attaching spring harrow teeth. For the 56-inch cross bar, the teeth spacing is 16 inches on-center, 4 teeth per cross bar resulting in 8-inch tine spacing.

3. Make backstops, 3/16" x 1 1/2" x 4" plate with two 3/8-inch diameter bolt holes, 3 1/4 inch apart, to prevent the spring harrow teeth from rotating backwards on the cross bar. Bolt the backstop on the cross bar with two 3/8 x 2-inch bolts. These bolts also function as front-stops (Figure 5).

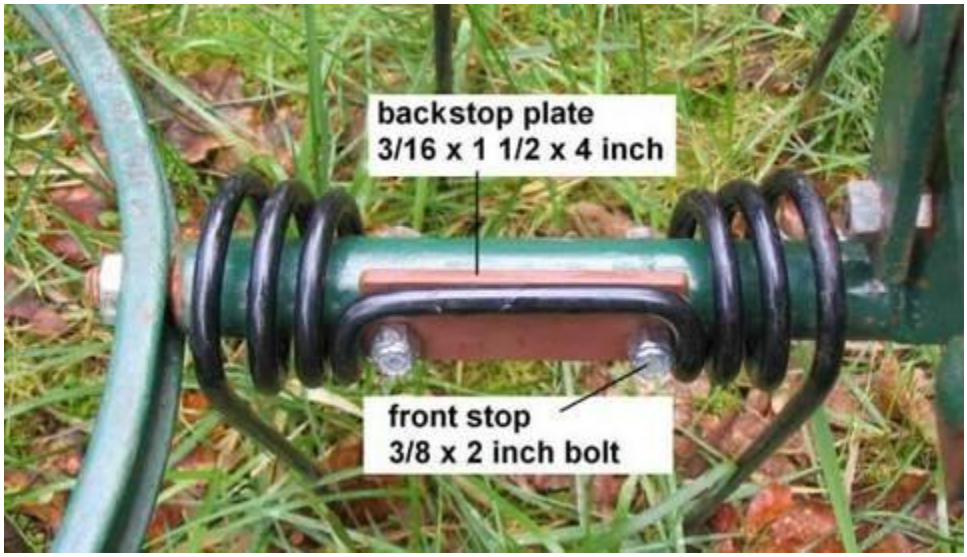

Figure 5. Spring harrow teeth showing backstop plate and front-stop bolts.

4. Make cross bar handles (3/16 x 11/2 x 11/2-inch angle 6 inches long, Figure 6). Some spike-tooth harrows have bolt-on cross bar handles that can be reused. Align the cross-bar handles so they do not obstruct the spring harrow teeth; and when all 5 cross bars handles are attached to the lever mechanism, the lever adjusts the tines in the forward, vertical, and backward positions in unison. The handles are welded in place. Drill bolt holes on the cross bar handles as appropriate to attach the lever mechanism.

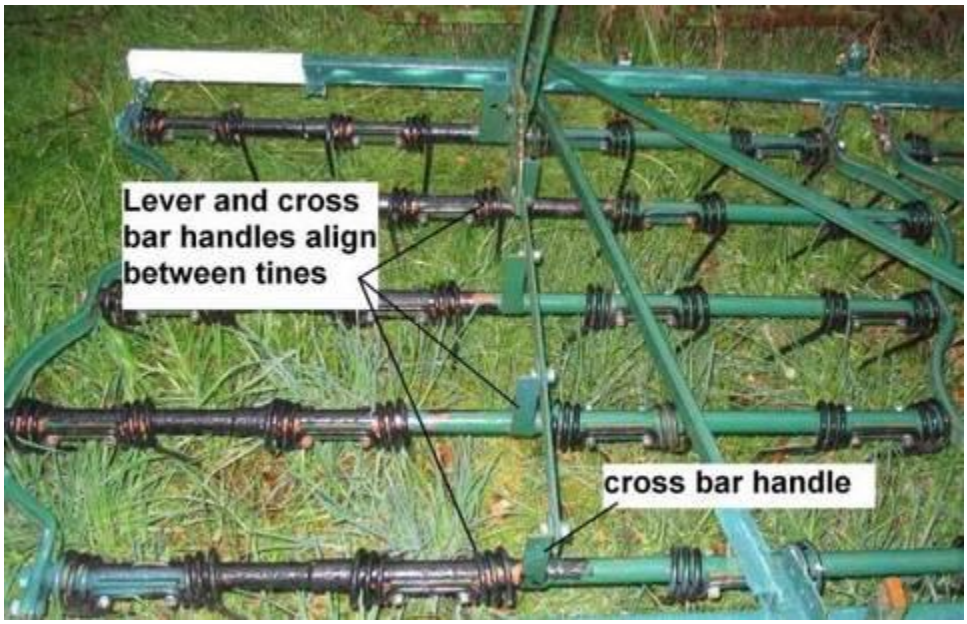

Figure 6. Lever mechanism aligned between spring harrow teeth.

5. Make 3-point frame with gauge wheels, attach flex-tine sections to frame with chain links (Figure 7).

Figure 7. Flex-tine cultivator, side view.

Additional information on using flex-tine cultivators is available from:
1. Bellinder, R. Cultivation tools for mechanical weed control in vegetables. Dept. Horticulture, Cornell University, NY
www.hort.cornell.edu/bellinder/publications/CultTools1.pdf
2. Bowman, G (editor). 1997. Steel in the Field, a farmer's guide to weed management tools. Sustainable Agriculture Publications, University of Vermont, Burlington, VT
3. Enders, G, D Berglund, A Dexter and R Zollinger. 1999. Mechanical Weed Control with a Harrow or Rotary Hoe. North Dakota State University Extension Service W-1134.
www.ext.nodak.edu/extpubs/weeds.htm
4. Grubinger, V. Cultivation equipment for weed control: pros, cons and sources. Vegetable and Berry Specialist, University of Vermont Extension.
www.uvm.edu/vtvegandberry/factsheets/cultivators.html

Note: Mention of product names does not imply endorsement

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